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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,354	04/11/2006	Maurizio Crozzoli	05788.0396	9360

22852 7590 02/04/2009

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EXAMINER	
HSIEH, PING Y	

ART UNIT	PAPER NUMBER
2618	

MAIL DATE	DELIVERY MODE
02/04/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,354	CROZZOLI ET AL.	
	Examiner	Art Unit	
	PING Y. HSIEH	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *33-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *33-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/21/08 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 33-36, 38-54 and 52-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Judd et al. (U.S. PG-PUB NO. 2003/0032424) in view of Ylitalo (U.S.

PATENT NO. 7,203,519) and further in view of Rhodes et al. (U.S. PG-PUB NO. 2004/0038714).

-Regarding claims 33 and 64, Judd et al. disclose a method for configuring the radiation characteristics of an antenna **(as disclosed in Fig. 4 and further disclosed in paragraph 44)**, the method comprising the steps of: including in said antenna a plurality of radiating elements **(M columns of antenna structure as disclosed in Fig. 4)**; associating each of said radiating elements with at least a respective signal processing chain located in an antenna unit **(N array elements as disclosed in Fig. 3 and 4 and further disclosed in paragraph 44)**, including in said respective signal processing chain: at least one antenna conversion set interposed between digital mux s and one of the radiating elements of the antenna **(A/D converter 106 and D/A converter 118 interposed between digital mux 108 and one of the radiating elements of the antenna as disclosed in Fig. 4)**, said antenna conversion set being configured to convert between digital signals processed by the at least one digital mux and analog signals transmitted and received at a radiating element **(see Fig. 4 and paragraph 46)**. However, Judd et al. fails to disclose at least one module for weighting digital signals the at least one module configured to apply at least a weighting coefficient to a digital signal; receiving, at the antenna unit, information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals; configuring at least one weighting coefficient in the modules for weighting digital signals based on the information received at the

antenna unit; and applying respective weighting coefficients to digital signals in each of the at least one module for weighting digital signals, said weighting coefficients determining the radiation characteristics of the antenna.

Ylitalo discloses at least one module for weighting digital signals the at least one module configured to apply at least a weighting coefficient to a digital signal **(weighting means 306 as disclosed in Fig. 3 and further disclosed in col. 4 lines 4-7)**; receiving, at the antenna unit, a data signal corresponding to one or more digital signals to be processed in the antenna unit **(see fig. 3 and col. 9 lines 38-42)** and a control signal including information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals **(see fig. 3 and col. 10 lines 4-18)**; configuring at least one weighting coefficient in the modules for weighting digital signals based on the information received at the antenna unit **(see fig. 3 and col. 10 lines 4-18)**; and applying respective weighting coefficients to digital signals in each of the at least one module for weighting digital signals, said weighting coefficients determining the radiation characteristics of the antenna **(see fig. 3 and col. 10 lines 4-18)**.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the weighting means 306, CNTL 320 and RX 322 as disclosed by Ylitalo to be incorporated with the antenna as disclosed by Judd et al. at the digital IF signal 103 as disclosed in Fig. 4. One is motivated as such in order to provide a more efficient frequency reuse by directing the antenna beams in the digital phasing of a complex vector form. However, the combination

does not specifically disclose the data signal and the control signal are on the same communication link.

Rhodes et al. disclose a single optical link is utilized to convey telecommunications data as well as control data as disclosed in paragraph 134.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the data signal and the control signal as disclosed by the combination of Judd et al. and Ylitalo to use the same optical link as disclosed by Rhodes et al. One is motivated as such in order to improve the data transfer speed by using optical link.

-Regarding claims 47, 61, 63 and 68, Judd et al. disclose an antenna with configurable radiation characteristics **(as disclosed in Fig. 4 and further disclosed in paragraph 44)**, the antenna comprising: a plurality of antenna radiating elements **(M columns of antenna structure as disclosed in Fig. 4)**; and an antenna unit comprising one or more signal processing chains associated with the plurality of radiating elements **(N array elements as disclosed in Fig. 3 and 4 and further disclosed in paragraph 44)**, the antenna unit further comprising: at least one antenna conversion set interposed between digital mux s and one of the radiating elements of the antenna **(A/D converter 106 and D/A converter 118 interposed between digital mux 108 and one of the radiating elements of the antenna as disclosed in Fig. 4)**, said antenna conversion set being configured to convert between digital signals processed by the at least one digital mux and analog signals transmitted and received at a radiating element

(see Fig. 4 and paragraph 46). However, Judd et al. fails to disclose at least one module for weighting digital signals, the at least one module configured to apply at least a weighting coefficient to a digital signal; and an interface configured to receive information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals, wherein the weighting coefficients applied by the modules for weighting digital signals determine the radiation characteristics of the antenna.

Ylitalo discloses at least one module for weighting digital signals, the at least one module configured to apply at least a weighting coefficient to a digital signal **(weighting means 306 as disclosed in Fig. 3 and further disclosed in col. 4 lines 4-7)**; and an interface configured to receive a data signal corresponding to one or more digital signals to be processed in the antenna unit **(see fig. 3 and col. 9 lines 38-42)** and a control signal including information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals, wherein the weighting coefficients applied by the modules for weighting digital signals determine the radiation characteristics of the antenna **(interface between weighting means 306, CNTL 320 and RX 322 as disclosed in fig. 3 and col. 10 lines 4-18)**.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the weighting means 306, CNTL 320 and RX 322 as disclosed by Ylitalo to be incorporated with the antenna as disclosed by Judd et al. at the digital IF signal 103 as disclosed in Fig. 4. One is motivated as such

in order to provide a more efficient frequency reuse by directing the antenna beams in the digital phasing of a complex vector form. However, the combination does not specifically disclose the data signal and the control signal are on the same communication link.

Rhodes et al. disclose a single optical link is utilised to convey telecommunications data as well as control data as disclosed in paragraph 134.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the data signal and the control signal as disclosed by the combination of Judd et al. and Ylitalo to use the same optical link as disclosed by Rhodes et al. One is motivated as such in order to improve the data transfer speed by using optical link.

-Regarding claims 34 and 48, the combination teaches all the limitations as claimed in claims 33 and 47. Even thought the combination fails to specifically disclose further discloses said signal processing chains comprise first and second digital signal weighting modules as well as first and second antenna conversion sets, said first module for weighting digital signals and first antenna conversion set operating on a signal transmitted by said radiating elements of the antenna, said second module for weighting digital signals and second antenna conversion set operating on a signal received from said radiating elements of said antenna, It would have been obvious to one of ordinary skills in the art at the time of invention to modify a first weighting means 306 to be incorporated with the processing chain as disclosed by Judd et al. between the A/D converter 106

and digital mux 108 as disclosed in Fig. 4 and a second weighting means 306 to be incorporated with the antenna as disclosed by Judd et al. between the A/D converter 118 and digital mux 108 as disclosed in Fig. 4. One is motivated as such in order to provide a more efficient frequency reuse by directing the antenna beams in the digital phasing of a complex vector form.

-Regarding claims 35, 36, 49 and 50, the combination further discloses at least one weighting control block configured to apply weighting coefficients in said first and second modules for weighting digital signals, such that the antenna employs the same radiation pattern for signal transmission and reception **(Ylitalo, the weighting coefficients are selected according to a typically adaptive algorithm in such a way that the desired radiation pattern is achieved as disclosed in col. 10 lines 4-18)**.

-Regarding claims 38 and 52, the combination further discloses at least one frequency converter that converts a signal between a radio frequency and an intermediate frequency **(see Judd et al., paragraph 45)**.

-Regarding claims 39 and 53, the combination further discloses said first and second antenna conversion sets are associated with signal distribution elements capable of operating both on signals transmitted and received at said antenna **(Judd et al., as disclosed in Fig. 4)**.

-Regarding claims 40 and 54, the combination further discloses at least one of said signal distribution elements is selected from a group of radio

frequency duplexers and switches **(Judd et al., frequency multiplexer 90 as disclosed in Fig. 4 and further disclosed in paragraph 45)**.

-Regarding claims 41 and 55, the combination further discloses a distributing element configured to: generate a plurality of replications of a signal to be transmitted by said antenna; and distribute said replications of the signal on respective signal processing chains associated with said radiating elements of the antenna **(Judd et al., a receive and transmit signal will be generated for each of the antenna columns 1-m as disclosed in Fig. 4 and further disclosed in paragraph 46)**.

-Regarding claims 42 and 56, the combination further discloses at least one element configured to combine a plurality of signals received at the radiating elements and subsequently processed by the signal processing chains, thereby forming a single received signal **(Judd et al., bracket 42 as disclosed in Fig. 4 and further disclosed in paragraph 45)**.

-Regarding claims 43 and 57, the combination further discloses an extraction module configured to extract said information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals **(Ylitalo, it is inherent for the control block 320 to extract said weighing coefficients as disclosed in col. 10 lines 4-18)**.

-Regarding claims 46 and 58, the combination further discloses said antenna unit is located in close proximity to the antenna **(Judd et al., as disclosed in Fig. 4)**.

-Regarding claims 44, 59 and 66, the combination further discloses the antenna unit further comprises an electro-optical converter module configured to convert an optical signal received at the interface into an electrical signal capable of being processed by said signal processing chains associated with said radiating elements of the antenna **(Judd et al., digital to fiber converter 60 as disclosed in Fig. 4 and further disclosed in paragraphs 38 and 46)**.

-Regarding claims 45 and 60, the combination of Judd et al. and Ylitalo discloses all the limitations as claimed in claims 47 and 59. Even thought the combination fails to specifically disclose said electro-optical converter module is associated with an extraction module configured to extract said information indicating at least one of the weighting coefficients applied by the modules for weighting digital signals, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the digital to fiber converter 60 as disclosed by Judd et al. to include the control block 320 to extract said weighting coefficients. One is motivated as such in order to provide a more efficient frequency reuse by directing the antenna beams in the digital phasing of a complex vector form.

-Regarding claim 62, the combination further discloses a control unit and an optical link for the transmission of an optical signal between said control unit and said electro-optical converter module associated to said antenna **(Judd et al., as disclosed in paragraph 40)**.

-Regarding claim 65, the combination further discloses the interface is a digital data link **(Ylitalo, as disclosed in fig. 3 and col. 10 lines 19-28)**.

-Regarding claim 67, the combination further discloses the apparatus is a radio base station **(Judd et al., as disclosed in paragraph 2)**.

-Regarding claim 69, the combination further discloses replicating a digital signal to generate a plurality of digital signals; and distributing each of the generated digital signals to a different module for weighting digital signals **(Ylitalo, as disclosed in fig. 3 and col. 10 lines 4-18)**.

5. Claims 37 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Judd et al. (U.S. PG-PUB NO. 2003/0032424) in view of Ylitalo (U.S. PATENT NO. 7,203,519), Rhodes et al. (U.S. PG-PUB NO. 2004/0038714) and further in view of Wang et al. (U.S. PATENT NO. 7,257,425).

-Regarding claims 37 and 51, the combination of Judd et al. and Ylitalo discloses all the limitations as claimed in claim 47. However, the combination fails to disclose said antenna conversion set comprises at least one frequency converter operating between the radio frequency and the base band.

Wang et al. disclose a RF processor 17 downconverts received RF signals for baseband processing as disclosed in col. 6 lines 15-22.

Therefore, it would have been obvious to one of ordinary skills in the art at the time of invention to modify the antenna as disclosed by Judd et al. and Ylitalo to include a RF processor 17 in order to downconvert RF to base band. One is motivated as such in order to decrease the bandwidth.

Response to Arguments

6. Applicant's arguments with respect to claims 33-69 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PING Y. HSIEH whose telephone number is (571)270-3011. The examiner can normally be reached on Monday-Thursday (alternate Fridays) 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay A. Maung can be reached on 571-272-7882. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. Y. H./
Examiner, Art Unit 2618

/Lana N. Le/
Primary Examiner, Art Unit 2614